# Impreza P1 1999-2000


SUBARU

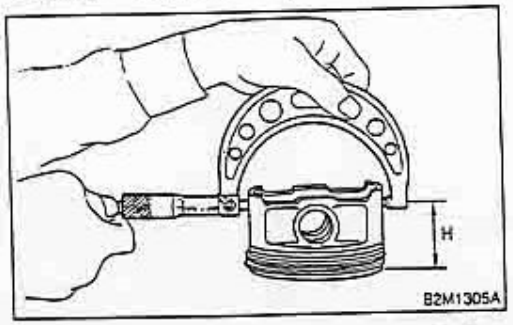
Exit

4) How to measure the outer diameter of each piston
Measure the outer diameter of each piston at the height shown in figure. (Thrust direction)

**CAUTION:**
**Measurement should be performed at a temperature of 20°C (68°F).**

*Piston grade point H:*
*40.0mm (1.575 in)*

*Piston outer diameter:*
*Standard*
*A: 91.985 — 91.995 mm (3.6214 — 3.6218 in)*
*B: 91.975 — 91.985 mm (3.6211 — 3.6214 in)*
*0.25 mm (0.0098 in) oversize*
*92.225 — 92.235 mm (3.6309 — 3.6313 in)*
*0.50 mm (0.0197 in) oversize*
*92.475 — 92.485 mm (3.6407 — 3.6411 in)*




5) Calculate the clearance between cylinder and piston.

**CAUTION:**
**Measurement should be performed at a temperature of 20°C (68°F).**

*Cylinder to piston clearance at 20°C (68°F):*
*Standard*
*0.010 — 0.030 mm (0.0004 — 0.0012 in)*
*Limit*
*0.050 mm (0.0020 in)*

6) Boring and honing
(1) If the value of taper, out-of-roundness, or cylinder-to-piston clearance measured exceeds the specified limit or if there is any damage on the cylinder wall, rebore it to use an oversize piston.

**CAUTION:**
**When any of the cylinders needs reboring, all other cylinders must be bored at the same time, and use oversize pistons. Do not perform boring on one cylinder only, nor use an oversize piston for one cylinder only.**

(2) If the cylinder inner diameter exceeds the limit after boring and honing, replace the crankcase.

**CAUTION:**
**Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention to this when measuring the cylinder diameter.**

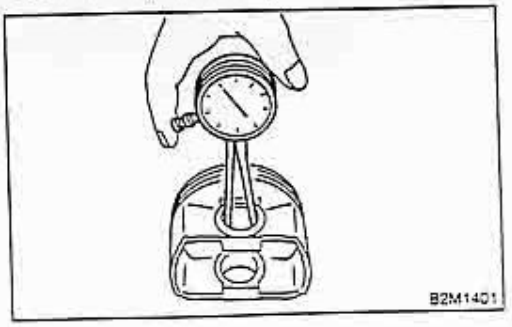
*Limit of cylinder enlarging (boring):*
*0.5 mm (0.020 in)*

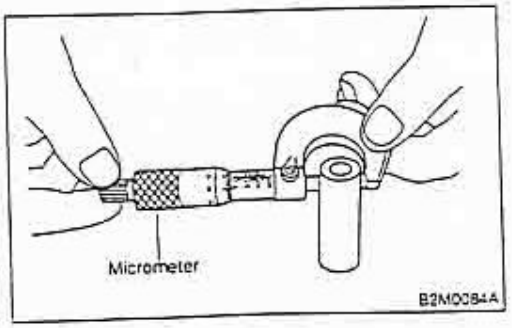
## 9. PISTON AND PISTON PIN

1) Check pistons and piston pins for damage, cracks, and wear and the piston ring grooves for wear and damage. Replace if defective.
2) Measure the piston-to-cylinder clearance at each cylinder.

If any of the clearances is not to specification, replace the piston or bore the cylinder to use an oversize piston.
3) Make sure that piston pin can be inserted into the piston pin hole with a thumb at 20°C (68°F). Replace if defective.

*Standard clearance between piston pin and hole in piston:*
*Standard*
*0.004 — 0.010 mm (0.0002 — 0.0004 in)*
*Limit*
*0.020 mm (0.0008 in)*

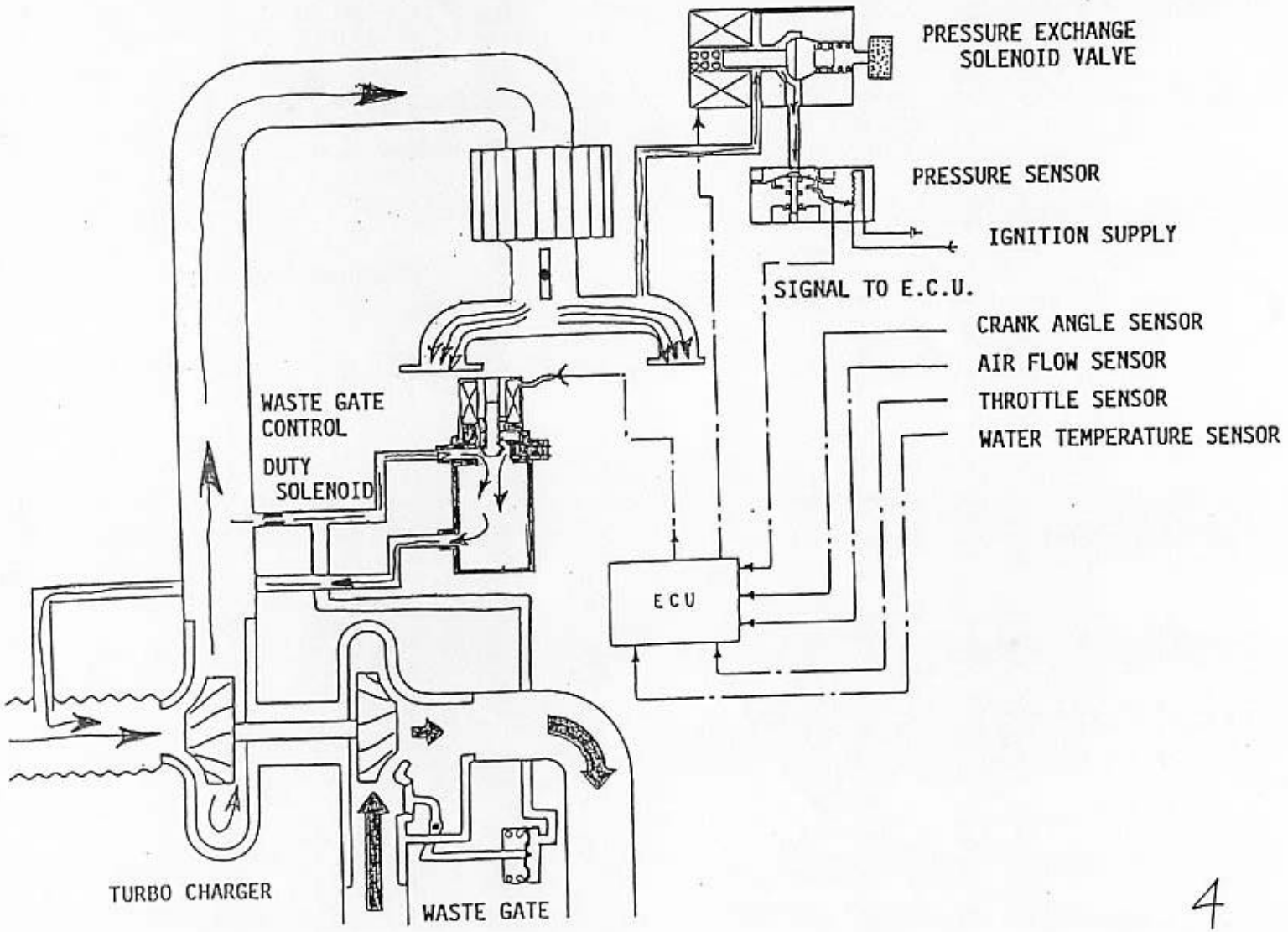


# Control Module I/O Signal

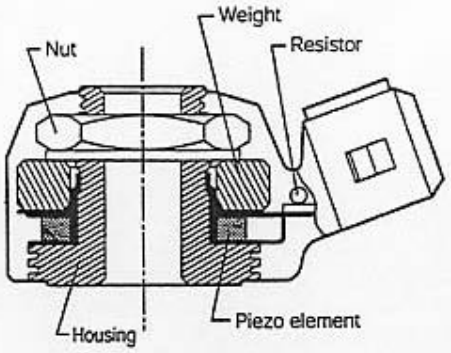
| Content | | Connector No. | Terminal No. | Signal (V) | | Note |
|---|---|---|---|---|---|---|
| | | | | Ignition SW ON (Engine OFF) | Engine ON (Idling) | |
| Crankshaft position sensor | Signal (+) | B136 | 6 | 0 | ±6 | Sensor output waveform |
| | Signal (–) | B136 | 23 | 0 | 0 | — |
| | Shield | B136 | 30 | 0 | 0 | — |
| Camshaft position sensor | Signal (+) | B136 | 5 | 0 | ±6 | Sensor output waveform |
| | Signal (–) | B136 | 23 | 0 | 0 | — |
| | Shield | B136 | 30 | 0 | 0 | — |
| Mass air flow sensor | Signal | B136 | 1 | 1 | 1.0 — 1.7 | — |
| | Shield | B136 | 30 | 0 | 0 | — |
| | GND | B136 | 31 | 0 | 0 | — |
| Throttle position sensor | Signal | B136 | 20 | Fully closed: 0.5±0.3<br>Fully opened: 4.3±0.3 | | — |
| | Power supply | B136 | 12 | 5 | 5 | — |
| | GND | B136 | 24 | 0 | 0 | — |
| Oxygen sensor | Signal | B136 | 21 | 0 | | Rich mixture: 0.7<br>Lean mixture: 0 |
| | Shield | B136 | 30 | 0 | 0 | — |
| Engine coolant temperature sensor | Signal | B136 | 28 | 0.6 — 1.0 | 0.6 — 1.0 | After warm-up |
| | GND | B136 | 24 | 0 | 0 | — |
| Intake air temperature sensor | | B136 | 19 | 2.5 — 2.3 | 1.4 — 1.6 | After warm-up |
| Vehicle speed sensor | | B135 | 26 | 0 or 5 | 0 or 5 | "5" and "0" are repeatedly displayed when vehicle is driven. |
| Starter switch | | B135 | 2 | 0 | 0 | Cranking: 10 to 14 |
| A/C switch | | B135 | 11 | ON: 10 — 13<br>OFF: 0 | ON: 13 — 14<br>OFF: 0 | — |
| Ignition switch | | B136 | 25 | 10 — 13 | 13 — 14 | — |
| Neutral position switch (MT) | | B135 | 29 | ON: 5<br>OFF: 0 | | Switch is ON when gear is in neutral position. |
| Test mode connector | | B135 | 22 | 5 | 5 | When connected: 0 |
| Read memory connector | | B135 | 13 | 5 | 5 | When connected: 0 |
| Back-up power supply | | B135 | 17 | 10 — 13 | 13 — 14 | — |
| Control unit power supply | | B136 | 9 | 10 — 13 | 13 — 14 | — |
| | | | 8 | | | |
| Ignition control | # 1, # 2 | B134 | 7 | 0 | 3.4, max. | — |
| | # 3, # 4 | B134 | 16 | 0 | 3.4, max. | — |
| Fuel injector | # 1 | B134 | 31 | 10 — 13 | 13 — 14 | Waveform |
| | # 2 | B134 | 32 | 10 — 13 | 13 — 14 | Waveform |
| | # 3 | B134 | 25 | 10 — 13 | 13 — 14 | Waveform |
| | # 4 | B134 | 18 | 10 — 13 | 13 — 14 | Waveform |

## TURBOCHARGER SYSTEM



## *Knock sensor*

This sensor is mounted on the cylinder block and detects knocking vibrations of the engine. It consists of a piezo-element, weight and case.
The piezo-element inside of the sensor converts vibration into voltage signal that is output to the ECM. ECM controls ignition timing based on the knock sensor signal.
As sensor signal is detected, ECM retards the ignition timing. When the knocking stops, the ignition timing is advanced again.

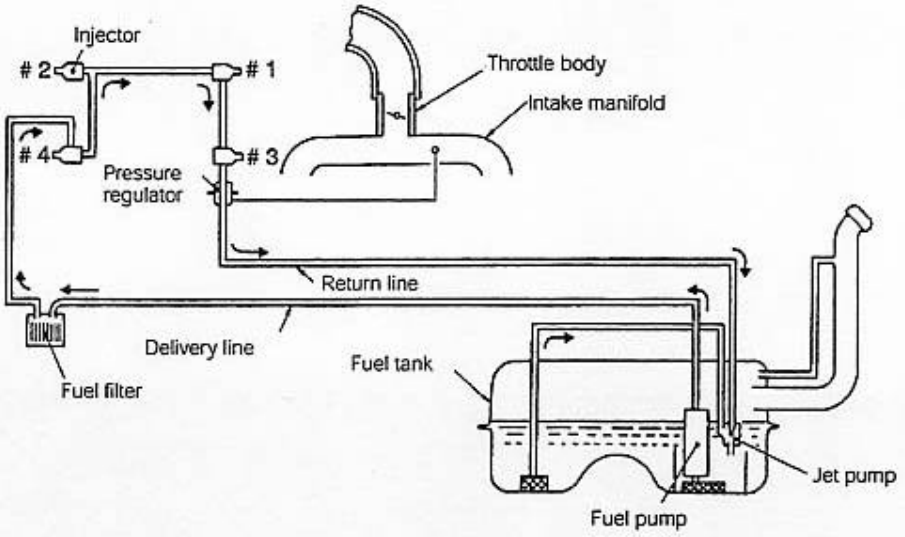



**TIGHTENING TORQUE: 21 to 27 N-m (2.1 to 2.7 Kg-m) (15.2 to 19.6 ft-lb)**

## *Fuel System*

The fuel system delivers the fuel required for combustion. Fuel sent to the injector from the fuel tank by the fuel pump is maintained at a specified pressure that is always greater than the intake manifold internal pressure by constant value. Fuel is injected into the intake manifold by the injector in accordance with injection signals from the ECM.

Today, the most common fuel system uses multi-point Fuel injection (MFI), which equips an injector at the intake port of each cylinder.The MFI system allows a high level of intake air system design, high-precision air-fuel ratio control, along with exceptional output, fuel economy, and exhaust gas characteristics.



| | | |
|---|---|---|
| CO2 | % VOL | 13% OR HIGHER |
| HC | ppmVOL | 200ppm MAX |
| O2 | % VOL | 3% MAX |
| CO | % VOL | 0.2% MAX |
| LAMBDA | | 0.97 to 1.03 |
| OIL TEMP | | MIN 80° C |
| ENGINE SPEED | IDLE | 700 to 900 rpm |
| | FAST IDLE | 2,400 to2,700 rpm |